

REMARKS

Claims 1-6 and 8-30 are all the claims pending in the application.

The Present Invention

The presently claimed invention relates to a process for producing a fibre composition comprising a lignocellulosic fibre material containing phenolic or similar structural groups capable of being oxidized, and a synthetic, electrically conductive polymer formed by polymerized monomers, according to which process the monomers are polymerized in the presence of the lignocellulosic fibre material to form a composition in which the polymer is bound to the fibres, characterized by oxidizing the phenolic groups or the groups having a similar structure to provide an oxidized fibre material, contacting the oxidized fibre material with a bifunctional substance to provide a modified lignocellulosic fibre material capable of binding monomers of the conductive polymer, and contacting the modified lignocellulosic fibre material with monomers of the conductive polymer under conditions conducive to polymerization to produce polymer chains of the synthetic, electrically conductive polymer, which are grafted to the surface of the lignocellulosic fibre material, wherein the bifunctional substance has at least two functional groups, where the first functional group participates in the binding of the modifying compound to the lignocellulosic fibre material and the second functional group forms a primer for binding to the polymeric material.

Response to Claim Rejections under 35 U.S.C. § 112

Referring to page 6 of the Office Action, claims 19 and 27 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. In particular, the Examiner indicates that the definition of “nkat/g” is indefinite.

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

At page 4 of the Action, the Examiner states:

In general activity values are measured in comparison to a standard set of assay conditions not a set of conditions which changes based on variable temperatures/pH's [see e.g. *Units of Enzyme Activity* pg. 319 #1]. Since the Applicant gives variable temperatures/pHs that can be used, the definition of nkat/g is also necessarily variable and indefinite.

The Examiner's argument fails to distinguish between two distinct senses of activity value. In "Chapter 4 (Enzyme Units) of *Enzyme Nomenclature: Recommendations 1964* of the International Union of Biochemistry" of *Units of Enzyme Activity* at page 319, a standard unit of enzyme activity is defined as that amount which will catalyze the transformation of 1 micromole of the substrate per minute under standard conditions. It is noted that Pederson calculates laccase enzyme activity in micromol per minutes.

According to *Units of Enzyme Activity*, the katal was introduced at the same time to define a new unit of enzyme activity. Particularly, the katal is used to express catalytic activity, and its numerical quantity value depends on the experimental conditions. *Units of Enzyme Activity* pg. 319 discloses that katal enzyme activity is the property measured by the increase in the rate of reaction of a specified chemical reaction that the enzyme produces in a specific assay system.

A person having ordinary skill in the art recognizes the difference between enzyme activity measure in micromol per minutes and enzyme activity measures in katals. Furthermore, the present specification provides sufficient disclosure of the activation treatment described at

page 7, lines 12-19 and the specific conditions of each chemical reaction described in the working examples so that enzyme activity can be calculated in katals.

Accordingly, it is respectfully requested that the § 112, second paragraph, of claims 19 and 27 be withdrawn.

Response to Double Patenting Rejections

Referring to page 8 of the Office Action, claims 1-5, 8-10, and 12-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6-10, 12, 13, 15-22, and 24 of copending Application No. 10/583,339. Claims 1-5 and 8-29 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6, and 8-20 of copending Application No. 10/583,711. Claims 1-5 and 8-29 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6, and 8-20 of copending Application No. 10/583,712.

Applicants wish to defer response to the rejections as they are provisional.

Response to Claim Rejections under 35 U.S.C. § 102 and 103

Referring to page 12 of the Office Action, claims 1-6, 8, 9, 12-13, 15 and 21-26 are rejected under 35 U.S.C. § 102(b) as allegedly anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as allegedly obvious over U.S. Patent No. 5,211,810 (Bart).

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

Bart discloses a method to produce an electrically conductive fibrous based material by suspending a fibrous based material in an aqueous solution, adding a monomer precursor of a conductive polymer to create a slurry, and inducing polymerization of the monomer precursor by

addition of a chemical oxidant. Bart discloses that polymerization into the conductive polymers occurs and coats the fibrous based material.

Regarding a bi-functional substance, the Examiner states that the added monomer polymerizes onto the fiber and the concentration of the monomer is controlled such that further polymerization of the conductive polymer occurs on the fiber [column 8, lines 9-15]. The Examiner states that the bi-functional substance and the monomer are the same.

Bart does not disclose or suggest a bi-functional monomer at col. 8, lines 9-15 or anywhere else. Therefore, Bart does not disclose or suggest each and every element of the presently claimed invention.

Accordingly, it is respectfully requested that the § 102 and § 103 rejections of claims 1-6, 8, 9, 12-13, 15 and 21-26 based on Bart be withdrawn.

Referring to page 15 of the Office Action, claim 11 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Bart.

Claim 11 depends from claim 1, and thus, is patentable by virtue of its dependency from claim 1 which is patentable for the reasons discussed above.

Accordingly, withdrawal of the §103 rejection of claim 11 is respectfully requested.

Referring to page 16 of the Office Action, claims 14, 16-20 and 27-30 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Bart in view of U.S. Patent No. 6,187,136 (Pederson).

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

Claims 14, 16-20 and 27-30 depend from claim 1, and thus, are patentable for at least the reason that Bart does not disclose, teach or suggest all the elements of claim 1 as discussed above and Pederson fails to remedy the deficiencies of Bart (see discussion of Pederson below).

Furthermore, the presently claimed invention is patentable over the cited references for the following reasons.

The Examiner states that Bart does not disclose using an oxidative enzyme. However, the Examiner takes the position that at the time of the invention, it would have been *prima facie* obvious to substitute the chemical oxidant of Bart for the enzymatic oxidant of Pederson. However, Applicants note that Pederson discloses an oxidizing agent to induce the oxidation reaction of the lignocellulosic material and the phenolic substance and an enzyme to catalyze the oxidation of the phenolic groups. Therefore, it is not clear what the Examiner means by saying the chemical oxidant of Bart can be substituted for the enzymatic oxidant of Pederson. Specifically, it is unclear as to whether the Examiner is proposing substituting Bart's chemical oxidant with Pederson's oxidant or Pederson's enzyme. Nonetheless, Pederson's oxidant and Pederson's enzyme serve different purposes, and therefore, are not interchangeable. Furthermore, if Bart's chemical oxidant was substituted with either Pederson's oxidant or Pederson's enzyme, the other one would be missing, and thus, the presently claimed invention would not be achieved.

In view of the above, it is submitted that the presently claimed invention is not rendered obvious in view of the cited references. Accordingly, withdrawal of the § 103 rejection of claims 14, 16-20 and 27-30 is respectfully requested.

Referring to page 18 of the Action, claims 1-10, 12-18, 20-26 and 28-30 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Pederson.

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

The present invention relates to a process of obtaining a fiber matrix comprising a grafted polymer which is capable of rendering electrically conductive properties. The lignocellulosic fiber material containing a phenolic group is reacted with a substance capable of catalyzing the oxidation of the phenolic group to provide an oxidized fiber material. The oxidized fiber material is bonded to a modifying agent to provide a modified fiber material. The modified fiber material is contacted with the monomers of a polymer, which are polymerized in such a way that one end of the polymer chain is attached to the primered matrix. The polymer can be rendered properties of electrical conductivity.

In contrast, Pederson provides a process for the production of a modified lignocellulosic material. In this case, a lignocellulosic material and a phenolic substance are subject to an oxidation reaction brought about by the presence of an appropriate oxidizing agent and enzyme capable of catalyzing the oxidation of the phenolic groups by that oxidizing agent. The oxidation products of the lignocellulosic material and the phenolic substance are then allowed to react with each other so as to form the modified lignocellulosic material. *See* col. 3, lines 44-53. The phenolic substance when conjugated or grafted to the lignocellulosic material can confer a negative charge. *See* col. 3, lines 35-43 and col. 5, lines 20-23. The modified lignocellulosic material can be treated with a strengthening agent having an ionic charge of sign opposite to that which is conferred on the modified substituent. *See* cols. 8-9, lines 62-67 and 1-3.

Pederson discloses a lignocellulosic material, phenolic substance and strengthening agent; however, Pederson does not disclose a lignocellulosic fiber material containing phenolic group, modifying agent, and grafted polymer as recited in the presently claimed invention. The

modifying agent of the present invention is bonded to the oxidized lignocellulosic fiber material and simultaneously grafted to the polymer, whereas Pederson's phenolic group is grafted to the oxidized lignocellulosic material and can confer a negative charge allowing it to ionically bind to a strengthening agent. The grafted polymer of the present invention can be rendered properties of electrical conductivity, whereas Pederson's strengthening agent must have an ionic charge of sign opposite to that which is conferred on the phenolic group in order to bind to it. Additionally, Pederson does not disclose or render obvious the direct bonding to the fiber of a bifunctional modifying agent which works as a primer for a conductive polymer to the fiber as described in the present invention.

Pederson does not anticipate the presently claimed invention. Accordingly, Applicants respectfully requested withdrawal of the § 102 rejection of claims 1-10, 12-18, 20-26 and 28-30 based on Pederson.

Referring to page 20 of the Office Action, claims 19 and 27 are rejected under 35 U.S.C. § 102(b) as allegedly anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as allegedly obvious over Pederson.

Claims 19 and 27 depends from claim 1, and thus, are patentable by virtue of their dependencies from claim 1 which is patentable for the reasons discussed above.

Accordingly, withdrawal of the § 102 rejection or, in the alternative, § 103 rejection of claims 19 and 27 based on Pederson is respectfully requested.

Referring to page 20 of the Office Action, claim 11 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Pederson.

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

Claim 11 depends from claim 1, and thus, is patentable by virtue of its dependency from claim 1 which is patentable for the reasons discussed above.

Furthermore, claim 11 requires that the bifunctional substance and the monomer in the process of claim 1 are different.

The Examiner cites Pederson at col. 9, lines 30-46 as disclosing that multiple conductive monomers can be used to form and conductive polymer bound to the fiber.

However, Pederson at col. 9, lines 30-46 discloses non-phenolic species that can be used in place of, not in combination with, the phenolic groups. Specifically, the disclosure states,

Thus, instead of using a phenolic substance in a process of the invention as disclosed herein, it is equally possible to employ another type of substance (e.g. of the aromatic amine type)

Accordingly, a person having ordinary skill in the art would not use a mixture of the monomer based on this disclosure, as the Examiner suggests.

In view of the above, Applicants respectfully requested withdrawal of the § 103 rejection of claim 11 based on Pederson.

Referring to page 21 of the Office Action, claims 1-6, 8-11 and 13-30 are rejected under 103(a) as allegedly being unpatentable over Pederson in view of Bart.

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

Neither Pederson nor Bart teaches or suggests all the elements of the presently claimed invention as discussed above. Even if combined, the claimed invention would not have been achieved. Thus, the presently claimed invention is not rendered obvious by the cited references, whether taken alone or in combination.

Accordingly, withdrawal of the § 103 rejection of claims 1-6, 8-11 and 13-30 over Pederson in view of Bart is respectfully requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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